Knoxville Utilities Board

Knoxville Smart Grid Community Project

Abstract

The Knoxville Smart Grid Community project includes the deployment of advanced metering infrastructure (AMI) infrastructure and distribution automation assets. The project aims to reduce costs for operations, maintenance, and electricity through reduced meter reading expenses, faster outage detection, and improved peak load management. It is also aimed at increasing distribution system efficiency, reliability, and power quality. Better power quality and reactive power management are being addressed with fault current indicators and volt ampere reactive (VAR) control at substations. Furthermore, the Knoxville Utilities Board (KUB) is collaborating with The University of Tennessee to analyze the metering and distribution data.

At-A-Glance

Recipient: Knoxville Utilities Board

State: Tennessee

NERC Region: SERC Reliability Corporation

Total Budget: $7,170,043

Federal Share: $3,585,022

Project Type: Advanced Metering Infrastructure and Customer Systems: Electric Distribution Systems

Equipment

- **4,200 Electric Smart Meters**
- **AMI Communication Systems**
  - **Meter Communications Networks**
  - **Backhaul Communications**
- **100 Programmable Communicating Thermostats**
- **Customer System Communications Network**
- **Customer Systems for 4,200 Customers**
  - **Home Area Networks**
  - **Web Portal Access**
  - **In-Home Displays/Energy Management Systems**
- **Distribution Automation Equipment for 5 Out of 261 Circuits**
  - **Distribution Automation Communications Network**
  - **Automated Voltage Regulators**
  - **Equipment Condition Monitors**

Key Targeted Benefits

- **Reduced Electricity Costs for Customers**
- **Reduced Meter Reading Costs**
- **Reduced Operating and Maintenance Costs**
- **Reduced Costs from Theft and Distribution Line Losses**
- **Improved Electric Service Reliability and Power Quality**
- **Reduced Truck Fleet Fuel Usage**
- **Reduced Greenhouse Gas and Criteria Pollutant Emissions**

Smart Grid Features

Communications infrastructure includes an advanced network system that provides the backbone for the AMI. The system collects and processes data from the distribution sensors for distribution automation and load management.

Advanced metering infrastructure includes the deployment of 3,800 smart meters to residential customers and 400 to the largest commercial and industrial customers in the service territory. The meters allow KUB to lower its operations costs by reducing the number of truck rolls and meter reading costs.

Advanced electricity service options include home area networks, in-home displays, programmable communicating thermostats, and Web portal access provided to the 4,200 residential, commercial, and industrial customers within the project area. These devices facilitate two-way information exchange and enable customers to better manage their electricity bills through improved understanding of electricity consumption patterns of appliances and equipment. The Web portal allows customers to view how much energy they are using on an hourly, daily, weekly, or monthly basis.

Distribution automation systems include advanced automated equipment to improve the performance of the distribution equipment. KUB is deploying automated regulators and fault current indicators to complement and enhance the existing supervisory control and data acquisition and distribution

Knoxville Utilities Board *(continued)*

systems. Improved fault isolation provided by fault current indicators, along with more accurate outage status provided by the smart meters, reduces power interruptions, thus improving distribution system reliability and operational efficiency.

Distribution system energy efficiency improvements involve integrating the operations of automated regulators at substations with voltage information collected through AMI. The regulators improve voltage and VAR control, power quality, and distribution capacity by reducing energy losses on the distribution system.

Timeline

Key Milestones	Target Dates
Phase 1 AMI communications infrastructure installation complete	Q2 2011
Phase 1 meter deployment in the KSGC area complete	Q3 2011
Phase 2 AMI collector installation complete	Q1 2012
Phase 2 meter deployment complete	Q3 2012
Phase 3 meter deployment complete	Q3 2012
Load control management system / home area network deployment complete	Q2 2013
Volt/VAR implementation complete	Q2 2013

Contact Information

Eric Greene
Business Management Analyst
Knoxville Utilities Board
Eric.Greene@kub.org